What is claimed is:

1. A distortion compensation method comprising:

determining an undisturbed phase for at least one of a first position indication signal and a second position indication signal;

determining an undisturbed ratio that relates the amplitude of the first position indication signal at a first frequency to the amplitude of the second position indication signal at a second frequency;

determining a disturbed amplitude and phase of the position indication signal; and

adjusting a position indication based on the disturbed amplitude and phase, the undisturbed amplitude ratio, and the undisturbed phase.

2. The method of claim 1 further comprising calculating a relationship between the eddy current phases of the first position indication signal and the second position indication signal.

3. The method of claim 1 further comprising:

determining a second undisturbed ratio that relates the amplitude of either of the first and the second position indication signals to the amplitude of a third position indication signal at a third frequency, and

adjusting a position indication is further based on the second undisturbed ratio.

4. The method of claim 1 wherein the first frequency is a superior harmonic of the second position indication signal and the second frequency is a subordinate harmonic of the first position indication signal.

5. The method of claim 4 wherein the superior harmonic is the fundamental frequency.

6. The method of claim 4 wherein the subordinate harmonic is a third order harmonic.

7. The method of claim 1 wherein the first frequency is less than the second frequency.

8. The method of claim 1 further comprising generating a plurality of frequencies using a multiple frequency waveform.

9. The method of claim 8 wherein the multiple frequency waveform is a chirped waveform.

10. The method of claim 1 wherein the selected first frequency and second frequency are harmonically related.

11. The method of claim 1 wherein the distortion compensation method is repeated for a plurality of position indication signals.

12. The method of claim 1 further comprising detecting the presence of an eddy current in a conductive object.

13. The method of claim 12 wherein detecting the presence of an eddy current includes monitoring a ratio of the amplitude of the first position indication signal and the amplitude of the second position indication signal.

14. The method of claim 12 wherein detecting the presence of an eddy current includes detecting a change in the undisturbed phase.

15. The method of claim 1 wherein determining the undisturbed phase includes measuring asymptotic phase values and using the asymptotic phase values to calculate the undisturbed phase.

16. The method of claim 15 wherein determining the undisturbed phase includes iteratively calculating phase values and adjusting an asymptotic phase value, the asymptotic phase value used to calculate the undisturbed phase.

17. The method of claim 1 further comprising receiving from a sensor the real and imaginary components of the first and second position indication signals.

18. A distortion compensation method comprising:

determining a characteristic mathematical formulation that describes an undistorted frequency function;

monitoring the characteristics of the mathematical formulation to indicate the presence of conductive objects; and

adjusting the characteristic mathematical formulation to compensate for distortions of a disturbed frequency function.

19. The method of claim 18 wherein monitoring the characteristics of the mathematical formulation includes monitoring the characteristics of the mathematical formulation in subsequent real-time measurements.

20. The method of claim 18 wherein the mathematical formulation is a complex polynomial function.

21. The method of claim 18 wherein the disturbed frequency function describes real and imaginary components of the position indication signal.

22.The method of claim 18 wherein the disturbed frequency function describes the amplitude and phase of the position indication signal.

23. A method for detecting the presence of conductive objects, the method comprising:

determining a characteristic frequency function of an undisturbed magnetic tracking system;

measuring a disturbed real-time frequency function;

calculating real and imaginary components of the position indication signal using a chi-squared minimization of the disturbed frequency function to the undisturbed frequency function;

calculating a chi-squared value based on the characteristic frequency function and the disturbed frequency function; and

monitoring the chi-squared value to detect changes indicating the presence of a conductive object.

24. The method of claim 23 wherein determining the characteristic frequency function includes determining the characteristic frequency function based on undisturbed position indication signals.

25. The method of claim 23 further comprising monitoring the chi-squared value for a plurality of position indication signals.

26. The method of claim 25 wherein detecting a change in the chi-squared value of at least one of the plurality of position indication signals indicates the presence of conductive objects.

27. The method of claim 23 further comprising determining, calculating, and monitoring the chi-squared value for a plurality of frequencies.

28. The method of claim 27 wherein the detection of a change in a chi-squared value at a particular frequency range can indicate the presence of a particular type of conductive objects.

29. The method of claim 28 wherein the particular frequency range is a mid-frequency range.

30. The method of claim 28 wherein the particular frequency range is a low-frequency range.

31. The method of claim 28 wherein the particular frequency range is a high-frequency range.

32. The method of claim 28 further comprising determining the position indication signal in a frequency range that is not affected by a particular type of conductive object.

33. A method comprising:

measuring characteristics of a conductive object;

determining an eddy current phase based on the characterization;

measuring a disturbed amplitude; and

calculating an undisturbed amplitude based on the eddy current phase, an undisturbed sensor phase, and the disturbed amplitude.

34. The method of claim 33 wherein measuring characteristics of a conductive object includes:

moving the conductive object in the vicinity of a stationary sensor; and

collecting a set of disturbed data points.

35. The method of claim 33 further comprising compensating a position indication based on the calculated undisturbed amplitude.

36. The method of claim 33 wherein a numerical method is used to solve a set of equations.

37. The method of claim 33 wherein a closed form solution is used to solve a set of equations.